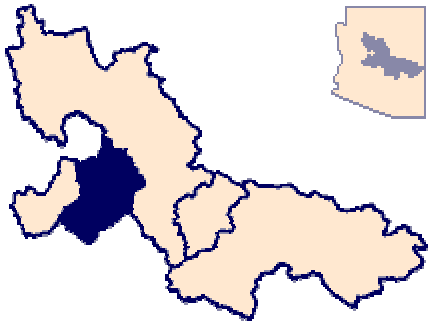
AGUA FRIA BASIN



The Agua Fria basin occupies about 1,200 square miles in central Arizona (Figure 3). The northern half of the basin is in the Central highlands physiographic province, and the southern half is in the Basin and Range province. The basin's main drainage is the Agua Fria River, which flows north to south through the basin and empties into Lake Pleasant. Major tributaries to the Agua Fria are Big Bug, Silver, Sycamore, and Yellow Jacket Creeks. The Agua Fria and its tributaries are generally intermittent streams except for some perennial stretches where impermeable bedrock forces groundwater into the streambed. The basin is bounded on the north by Hickey Mountain, on the west by the Bradshaw and Buckhorn Mountains, on the south by Lake Pleasant, and on the east by the Black Hills and New River Mountains. Land-surface elevations in the Agua Fria basin vary from 1,570 feet above mean sea level at Lake Pleasant to 7,800 feet above mean sea level in the Bradshaw Mountains.

Rock units in the Agua Fria basin can be divided into four broad groups based on general geologic character and their ability to yield water. The units are from youngest to oldest: basin-fill sands and gravels, volcanic rocks, conglomerates, and igneous and metamorphic rocks.

Groundwater occurs in all four rock units in the Agua Fria basin. The main water-bearing units are the basin-fill sands and the conglomerates. The volcanics and crystalline rocks yield only small amounts of water.

The basin-fill consists of sands and gravels and readily transmits recharge into the underlying conglomerate (Wilson, 1988). Because the basin-fill unit is thin it does not contain large quantities of groundwater in storage.

The volcanic rocks provide small amounts of water to low-yield stock wells in the northeastern sections of the basin. Well yields are best from cinder beds and fractured sections of the volcanics. A number of seasonal springs flow from the volcanics in response to precipitation or snowmelt (Littin, 1981).

Conglomerates occur widely throughout the basin and contain the largest volume of groundwater. Faulting formed the present-day drainage basins and separated the unit into several smaller, discrete groundwater basins that are separated by impermeable crystalline rocks. As a result, there is little direct subsurface hydrologic connection between the sedimentary units in the smaller groundwater basins (Wilson, 1988).

The water-bearing ability of the igneous and metamorphic rocks depends on their degree of fracturing. Most wells have low yields, however, near Black Canyon City wells drilled into the Precambrian schist can produce up to 20 gallons per minute (Littin, 1981). A number of perennial springs flow from the crystalline rocks. Normal discharges are 1 to 5 gallons per minute. Castle Hot Springs, located in the southwest part of the basin, discharges 200 gallons per minute from the Precambrian rocks (Littin, 1981).

Development of groundwater resources is increasing in the Agua Fria basin. Population growth in recent years has resulted in increased pumpage. The U.S. Geological Survey (1986) has estimated that groundwater pumpage increased from 3,000 acre-feet per year in 1979 to 10,000 acre-feet per year in 1987 (Alice Konieczki, U.S. Geological Survey, written commun., 1991). Although the U.S. Geological Survey groundwater basin boundary for the Agua Fria basin differs from the Arizona Department of Water Resources' boundary and includes the southeastern part of the Prescott AMA, this pumpage estimate is the best available at this time. Despite increased groundwater pumpage, water levels generally have not declined in the basin. The only area of declining water levels is around Cordes Junction where declines of several feet have been reported (Wilson, 1988). This suggests that overall the basin is still in a steady-state situation. Total groundwater reserves in the Agua Fria basin are estimated to be 3.5 million acre-feet (Arizona Department of Water

Resources, 1988).

Water quality in the basin generally is good. Near Black Canyon City, arsenic has been detected in the groundwater and is associated with the volcanic formations in the area (Arizona Department of Environmental Quality, 1990).